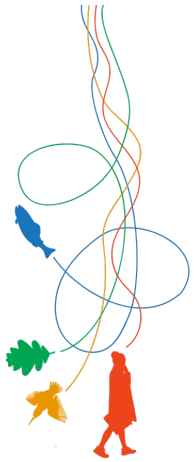
THE BIOREGIONAL LEARNING CENTRE

Water Data Sharing & Resource Pack



VOICES OF THE DART

The data in this pack is relevant first and foremost to the Dart Valley in South Devon. You will find that in Section Two. We then zoom out through Sections Three to Six, from Devon to Global. Because water is a global system, what happens on the other side of the world has an impact here. Being able to scan the horizon at all these scales helps us understand the complexity of the situation we find ourselves in, and the actions we can take locally to build resilience against future shocks to our freshwater supplies.

CONTENTS

This pack was put together for the 2021-22 Voices of the Dart project that was aimed at finding ways in which communities in the Dart Valley could reduce their water use. Sharing locally relevant data was an important part of this project, and this pack contains that data with links to websites. There are still gaps where data was not available and this will be re-visited. The project was funded by South West Water and we thank them for their support.

Section 1

Introduction

The summer of 1976 drought, when for 15 consecutive days temperatures were over 30 degrees and no rainfall fell in the UK, spurred a huge investment in infrastructure by water companies. It also spurred the UK government to require water companies to plan ahead over 25 years so that communities would not be forced in the future to resort to stand pipes. Now, due to population growth and climate change, we find ourselves at another crunch point and there is only so much that water companies can do. Building new reservoirs or desalination plants is costly in terms of energy, resources and money. We the customers would have the financial costs passed on to us in our bills. In addition, we have not built a new reservoir in the UK for decades, largely because clearing all the planning and legal hurdles necessary is so difficult and local opposition so fierce.

The way SWW is set up, as a private company, means that they are required to make a profit for their shareholders. At the same time, they are encouraging us to use less water because there is less of this precious natural resource available. It's a difficult position for a business to be in and that is facing SWW with a dilemma. Climate change is not just going to put pressure on water. It is going to put pressure on our current ways of doing business and thinking about value and risk. In 2018 the National Infrastructure Commission report on UKI infrastructure needs highlighted the risk of extreme drought and supported the twin track approach of investing to enhance supply and reduce demand, and noted that the investment cost of resilience (£21bn) is roughly half the cost of an extreme drought (£40bn).

Because water is so fundamental to life—we don't just drink it and wash in it and use it for cooking… water also grows our food and clothes, powers industry and manufacturing, and is essential for human health—it literally goes everywhere. The message is getting stronger that we can't just take it for granted and it is up to all of us to plan together for a water-stressed future. Demand for water is increasing just as our supply is becoming less reliable due to drier, hotter summers. Knowing what the realities of the situation are is a good starting point. Designing for action together: communities, businesses, policy-makers, water companies and river stakeholders is where we need to go next.

Section 2

The River Dart and its communities

In the Dart Valley, the Venford Dam on Dartmoor was built in 1907 to hold around 750 megalitres (millions of litres) of water. Each day it pipes on average 15.5 megalitres of treated water to our homes and also releases water via the Venford Brook into the River Dart to ensure that the river wildlife and whole river ecosystem is in good health.

When the water level in the River Dart falls at least two things happen. One is that fish and other aquatic life have less oxygen to breathe. The other is that toxins in the water become more concentrated. Toxins arrive in the water partly as run-off from farming and partly from what we humans pour down drains or take into our bodies via prescription medicines. Sewage treatment works are not able to remove all these nasties from water: they are designed to treat organic matter (sewage) as well as nitrates and phosphates, but not a host of other chemicals that kill off life in the water.

OFWAT (the UK Water Services Regulation Authority) is mandating that all UK water companies plan for 2050 flow to customers to be the same as now. At the same time the Environment Agency (responsible for environmental regulation) is carrying out a national programme to assess climate change impact by 2050. Using a relatively severe climate change scenario they are modelling:

- Potential changes to surface water flows
- The shortfall between predicted flows and Environmental Flow Targets (EFIs)
- Potential changes to levels in rivers and reservoirs due to reduced rainfall

The Dart assessment falls significantly short, below the EFI.

The Environment Agency's National Framework for Water report that came out in 2020 makes a strong push for collaborative action. Action that we can take in the Dart Valley is to link up with other communities in the catchment: developing a stronger catchment focus that brings together the Environment Agency, abstractors, communities and other partners to seek to agree a catchment-wide strategy for water that will balance everyone's needs and address unsustainable abstraction.

How much water is in the Dart?

During winter months the Dart below Buckfastleigh carries 1700 million litres of water a day (or 3 olympic swimming pools an hour) down to the sea. In the summer it is closer to 400 million litres a day. https://environment.data.gov.uk/...

How much water is taken out?

X litres per day are abstracted by the Dartington water treatment works (the largest private water treatment works in England). X litres per day are abstracted by Littlehempston water treatment works.

Local Weather

Dartmoor Weather Station: Situated near Two Bridges. The weather station gives real-time data measurements of the rainfall, temperature, humidity, pressure, wind direction, speed and gust. https://www.dartcom.co.uk/weather

Water Quality

Catchment Data from the Environment Agency: The quality of water in the River Dart catchment can be seen here (it currently only has data up to 2019). https://environment.data.gov.uk/catchment-planning/OperationalCatchment/3123

Chemicals in the Dart

Notably the Dart Water Body has been failing chemical tests for mercury, perfluorooctane sulphonate (PFOS) - used as a stain and water repellent for fabrics and polybrominated diphenyl ethers (PBDE) - used as flame retardants.

Dart History

Westcountry Rivers Trust website contains information about The Dart's history along with an interactive map highlighting some of the settlements and activities along it's tidal section. https://wrt.org.uk/project/river-dart/

Education for kids

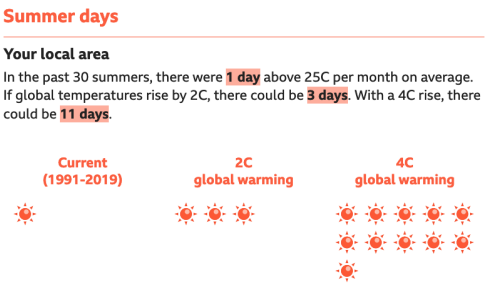
Animated film of the Dart's water cycle: *The Drip - A wettish tale from source to sea.* Made by South Devon AONB. https://www.youtube.com/watch?v=bSrgPLkvP8Q

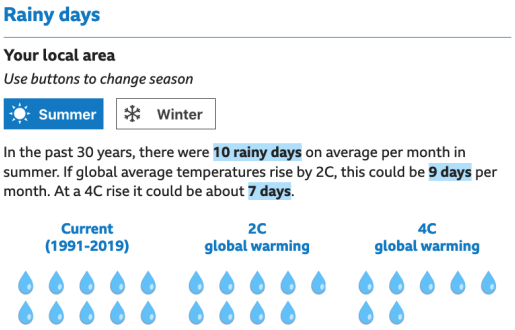
The Dart and the Arts

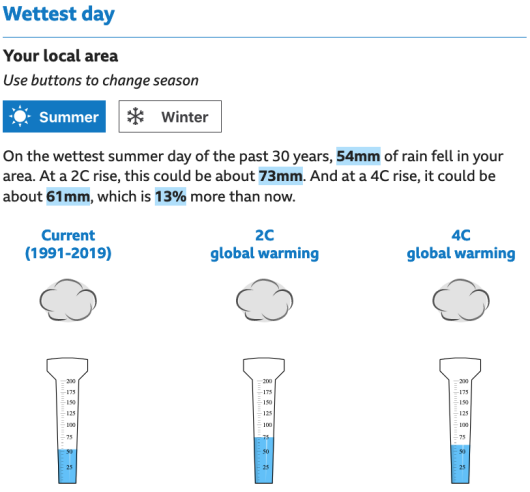
BBC radio play of Dart by Alice Oswald. https://archive.org/details/alice-oswald-dart

Water is life: Around 64% of a human body is water. In an average adult, a 72-kg body contains 40 litres of fluid.

The BBC and Met projections for Totnes future rainfall and temperature



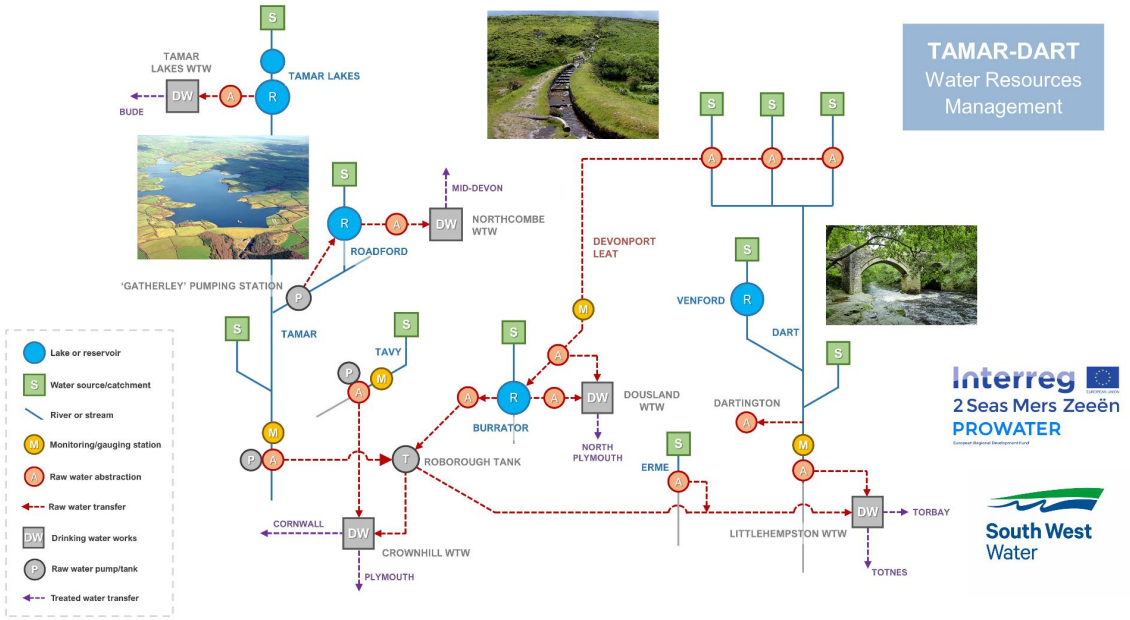




You can check out your local area climate change forecast by following this link: https://www.bbc.co.uk/news/resources/idt-d6338d9f-8789-4bc2-b6d7-3691c0e7d138

A map of how our drinking water is moved around South Devon: Tamar-Dart Water Resources Management

(Diagram by Dr Nick Paling, Head of Evidence & Data at Westcountry Rivers Trust)



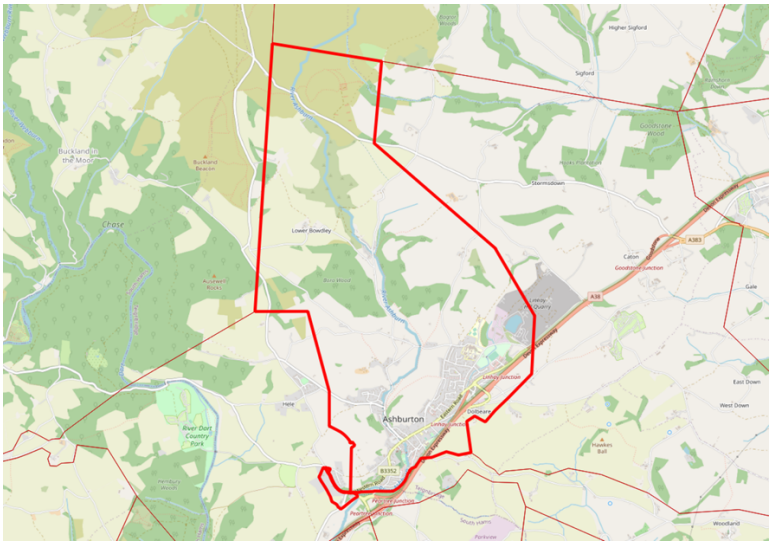
How communities can monitor how much water they are using

Currently, water metres tell us how much water we are using in our households. SWW also metres the supply rate into our district. Readings from the loggers (metres) in the District Metred Areas (DMAs) can be obtained monthly from SWW. They are a useful gauge of overall consumption in a community but results are sometimes skewed by leaks.

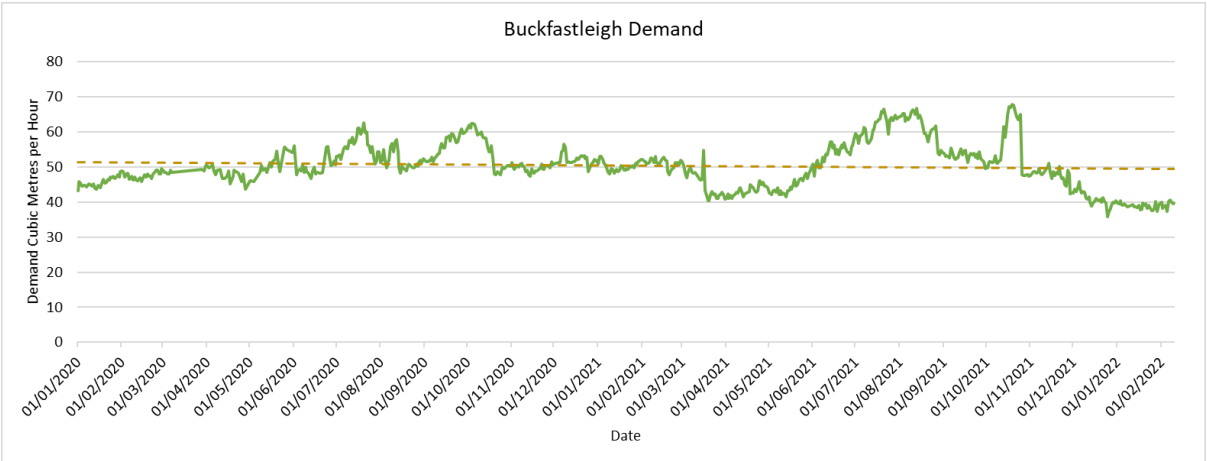
For reference, a cubic metre is equal to 1000 litres. The data for Ashburton includes Linhay Quarry and the data for Dartmouth Central includes Britannia Naval College.

Ashburton Demand and Map of the District Metred Area (up to February 2022)

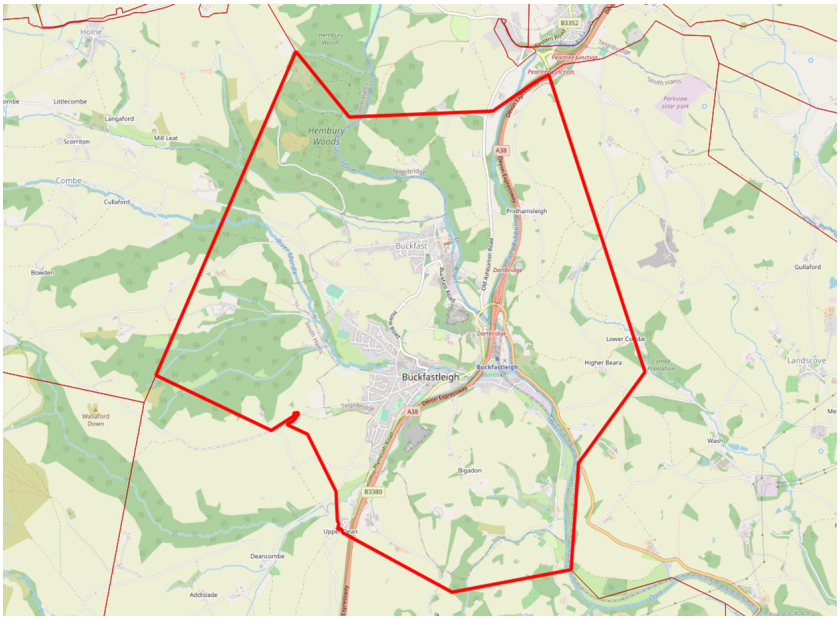
Key Facts & Map of District	
Average demand / litres per day	1,561,593
Percentage of total input*	0.246%
Length of mains /metres	18,338
Domestic Properties	1,602
Non-domestic properties	153



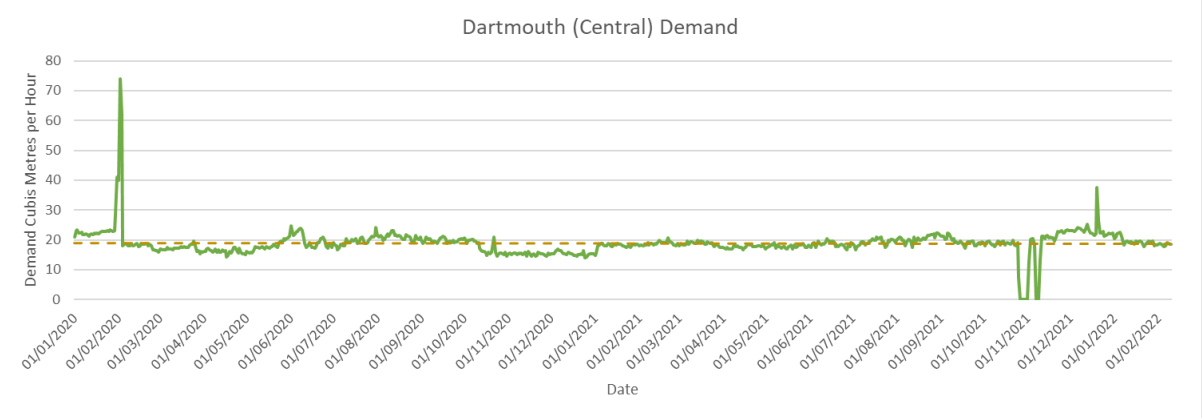
Buckfastleigh Demand and Map of the District Metred Area (up to February 2022)



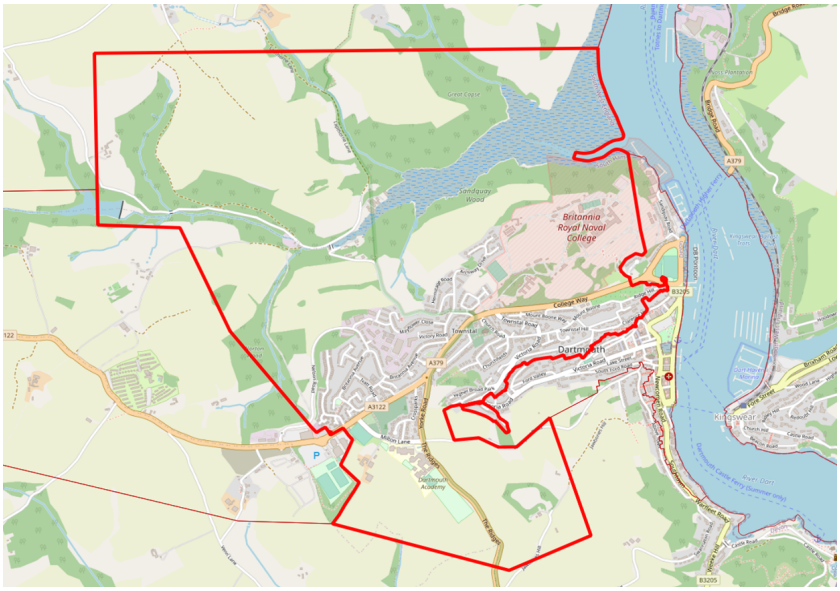
Key Facts & Map of District	
Average demand / litres per day	1,207,596
Percentage of total input*	0.190%
Length of mains /metres	20,096
Domestic Properties	1,745
Non-domestic properties	165



Dartmouth (central) Demand and Map of the District Metred Area (up to February 2022)

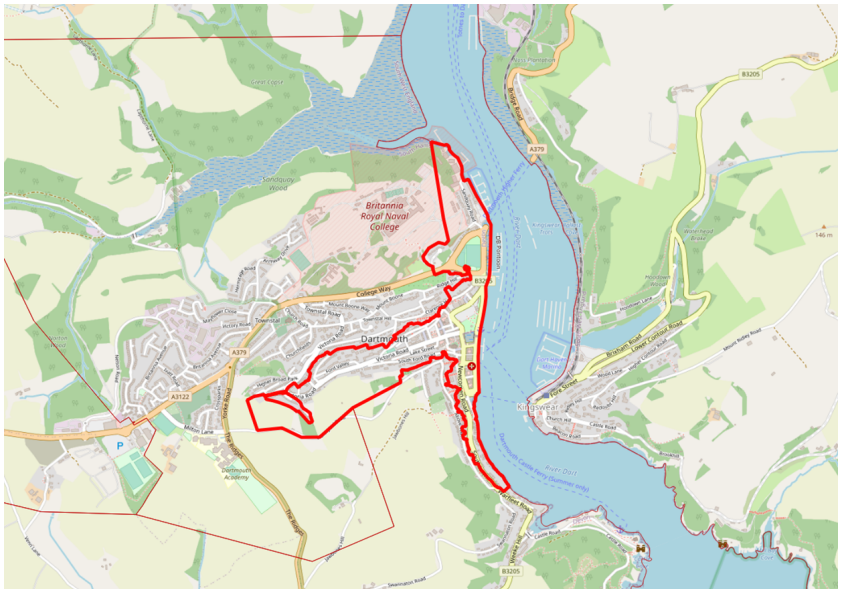


Key Facts & Map of District	
Average demand / litres per day	451,472
Percentage of total input*	0.071%
Length of mains /metres	18,839
Domestic Properties	1,669
Non-domestic properties	78



Dartmouth (waterside) Demand and Map of the District Metred Area (up to February 2022)

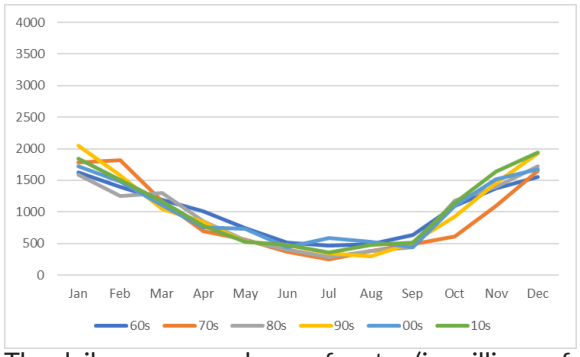
Key Facts & Map of District	
Average demand / litres per day	753,442
Percentage of total input*	0.119%
Length of mains /metres	7,881
Domestic Properties	1,408
Non-domestic properties	270



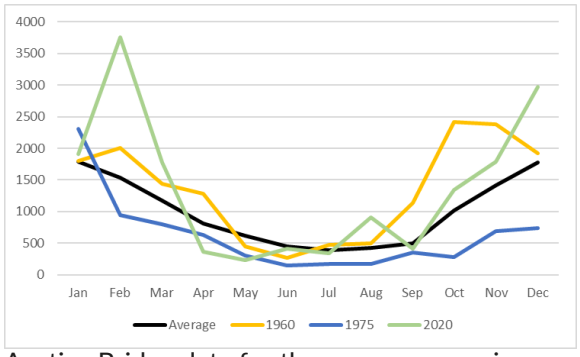
*As submitted for Apr 2021 Ofwat submission for South West and Bournemouth Water.

Insights on the River Dart from data collected at Austins Bridge measurement station, just downstream from Buckfastleigh

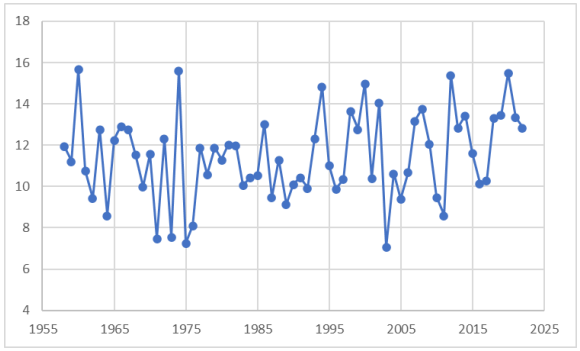
Using data obtained from… https://environment.data.gov.uk/hydrology/station/fd8ea26c-8052-48c5-a1bb-bbd5ebbbb3d3
https://check-for-flooding.service.gov.uk/station/3216



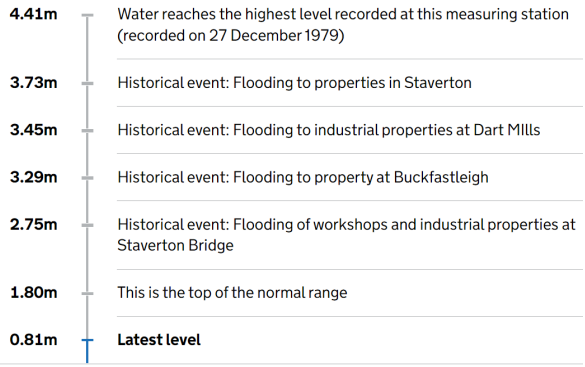
The daily average volume of water (in millions of litres per day) over a year in the River Dart as it passes Austins Bridge. Each line corresponds to a decade from 1960 up to 2020.



Austins Bridge data for the average year since 1959, the year with the lowest volume of water in 1975 and the years with the highest volume in 1960 and 2020. 1975-1976 was the famous drought period in the UK which triggered the government to ask water providers to always plan with the next 25 years in mind.



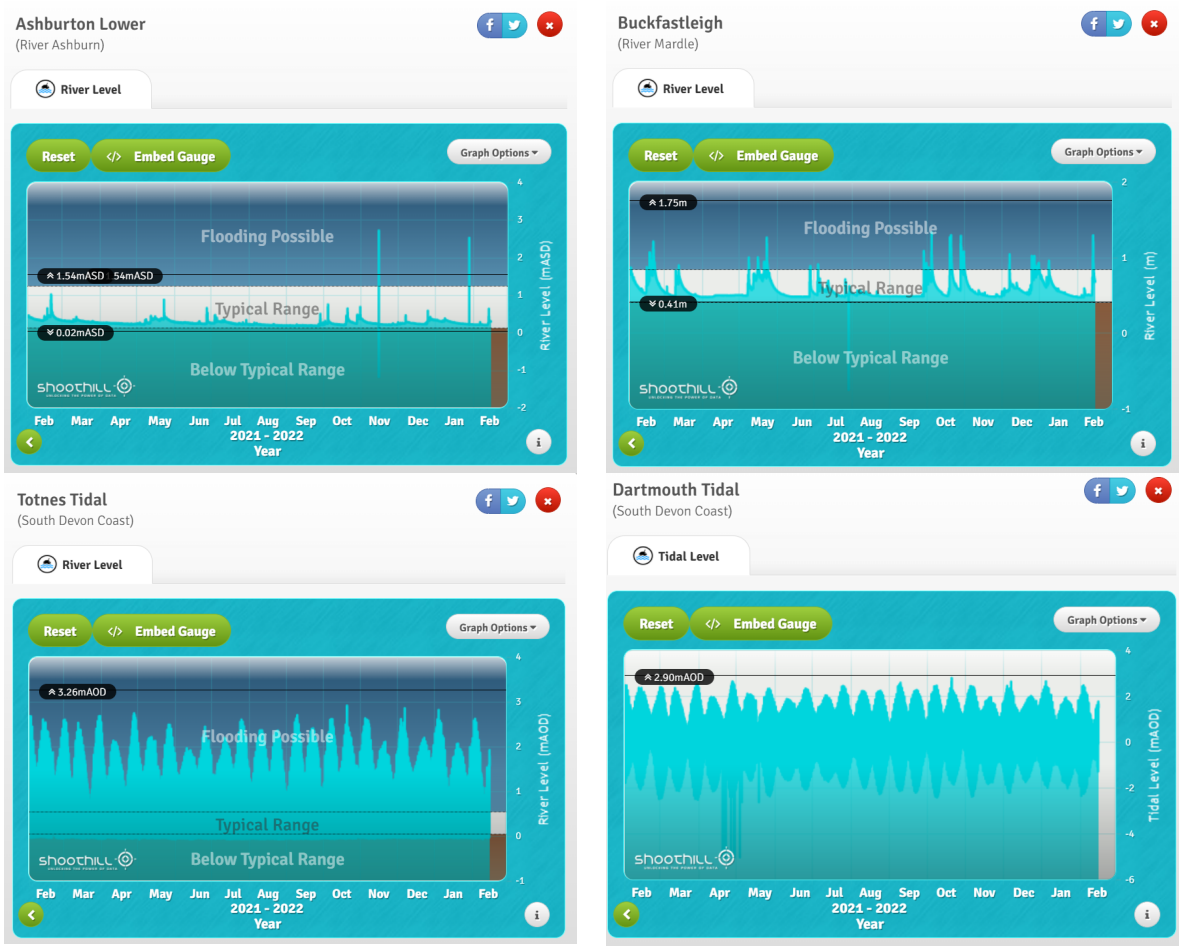
Average flow rate of the Dart at Austins Bridge, with years on the x-axis and flow rate in cubic metres per second on the y-axis

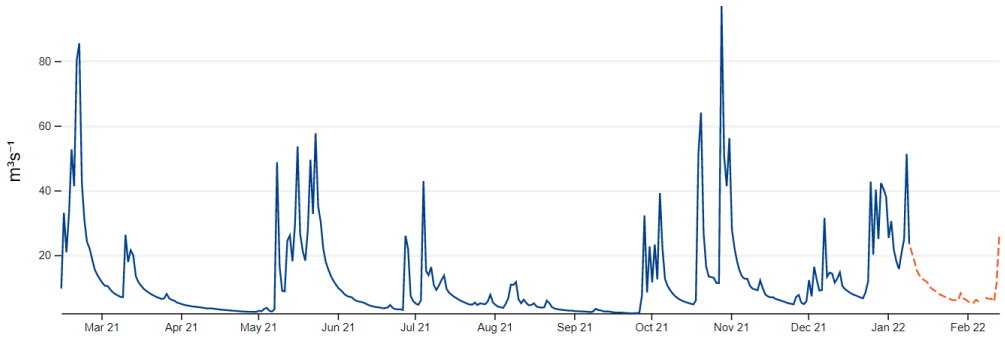


Historical events related to the height of the Dart at Austins Bridge.

Graphs showing river and tidal levels of the Dart and its tributaries between 2021-2022

Using Shoothill's gauge map of the UK which gives data from measurements stations on water level of rivers, groundwater, rainfall and river flow. https://www.gaugemap.co.uk/#!Map





Above: Daily mean flow rate of the Dart at Austin Bridge, Buckfastleigh, over the last year. March 2021 to January 2022. Follow this link for the most up to date information: https://environment.data.gov.uk/hydrology/station/fd8ea26c-8052-48c5-a1bb-bbd5ebbbb3d3

River Dart river levels at Austins Bridge, below Buckfastleigh: https://riverlevels.uk/river-dart-buckfastleigh-austins-bridge

Section 3

Devon Actions on Water

Wetter winters mean reservoirs fill up to capacity and the flow of rivers is more likely to spill over into flood. Drier summers however drain down the reservoirs to uncomfortable levels and rivers fall even lower than we are used to seeing. When this happens in South Devon, SWW currently pumps water across from the Roadford Reservoir north of Plymouth and in drought directly from the Tamar, just when that river is stressed. This also uses extra energy and that releases more carbon into the atmosphere.

In Devon, 45% of the drinking water is stored in our rivers, 45% in reservoirs and 10% in the ground (the water table). Soil is also a good way of storing water, if it has enough organic matter in it. Without organic matter rain runs off soil, taking topsoil with it and causing floods. Regenerative farming (organic included) increases the ability of our Devon soil to hold water.

The two main reservoirs that supply Devon (Roadford in the west and Wimbleball in the east) release in total an average of 330 million litres of water per day.
https://www.southwestwater.co.uk/environment/a-precious-resource/current-reservoir-storages/

The estimate of the total resident population of Devon made by Devon County Council in 2020 was around 811,000.
https://www.devon.gov.uk/factsandfigures/dataset/mid-year-population-estimates-by-age-and-gender/?geography=E10000008

In the summer, at peak times, SWW treats and pumps an additional 50 million litres a day. That's the same as supplying two extra cities the size of Exeter.

SWW is working to reduce demand by:
Plugging all the leaks in the drinking water system so 50% less is lost by 2050
Aiming to reduce customer consumption down to 110 litres per person per day by 2050
Constructing a pumped storage scheme at Devon's Roadford Reservoir (taking water during the winter, when it is abundant, out of rivers and putting it back in the reservoir)

Ways to take action

Save water when you flush

Flushing the toilet accounts for 30% of our water usage. Modern dual-flush systems save huge amounts of water. They use just 6 litres – or 4 with a reduced flush – much less than the 13 litres for each old-style single flush. South West Water also provide free water-saving devices that you can put in your cistern.

Reduce food waste

It takes a lot of water to produce our food. More than half of the 7 million tonnes of food and drink UK households bin every year could be eaten. Wasting less food could save you £540 a year.

Get some handy advice from Love Food Hate Waste.

Shower with less

Every minute you spend in a power shower uses up to 17 litres of water. Set a timer on your phone to keep your showers short, sweet and water-saving. South West Water provides free efficient shower-heads or equipment to adapt your existing shower.

Run full loads of washing

Washing a full machine load of clothes uses less water and energy than 2 half-loads. The same is true of the dishwasher. This means lower bills as well. Find out more about the most water- and energy-efficient ways to run your appliances from the Energy Saving Trust.

Use the rain from your roof

Every year enough rain water runs off the average roof to fill around 300 standard size water butts. Even collecting the water from a small shed can save over a thousand litres of water a year. Have you considered setting one up?

Turn off the taps

Don't let your water consumption run out of control. Save 6 litres of water a minute by turning off your tap while you brush your teeth. Fix leaky taps too – and stop what could be 60 litres of water going straight down the drain every week.

Boil what you need

Save water, money and energy by only boiling as many cups of water as you need. Steam your food to cut water usage and retain more of the natural nutrients. If you do boil, try using the leftover water as a tasty stock for soups, or to water your plants.

Time your gardening

Water outdoor plants in the early morning or at the end of the day to stop water immediately evaporating in sunlight and heat. Water the soil so that the liquid goes straight to the roots, where it's needed.

Quality and seasonal eating

Rearing animals for meat and dairy and harvesting crops like avocado and almonds at a large scale is incredibly water-intensive. By eating seasonal vegetables and considering reducing the quantity of meat and dairy you eat you'll be helping to conserve water.

Explore the feasibility of a water metre

Another potential area for action is using real time data correlating readings on household water metres with the levels in the local river and reservoir, making the impact of individual and collective water use visible.

Advocate for water use labelling

The introduction of water efficiency labelling of white goods like washing machines combined with product standards and building regulations could reduce per capita consumption by 30 litres a day in 25 years.

Regularly check the Dart water quality

The West Country Rivers Trust is looking for more Citizens Scientists in our area. Check out the Citizen Science Investigations (CSI) user manual to get a flavour of what this entails.

Section 4

South West-scale Infrastructure and Issues to do with Freshwater

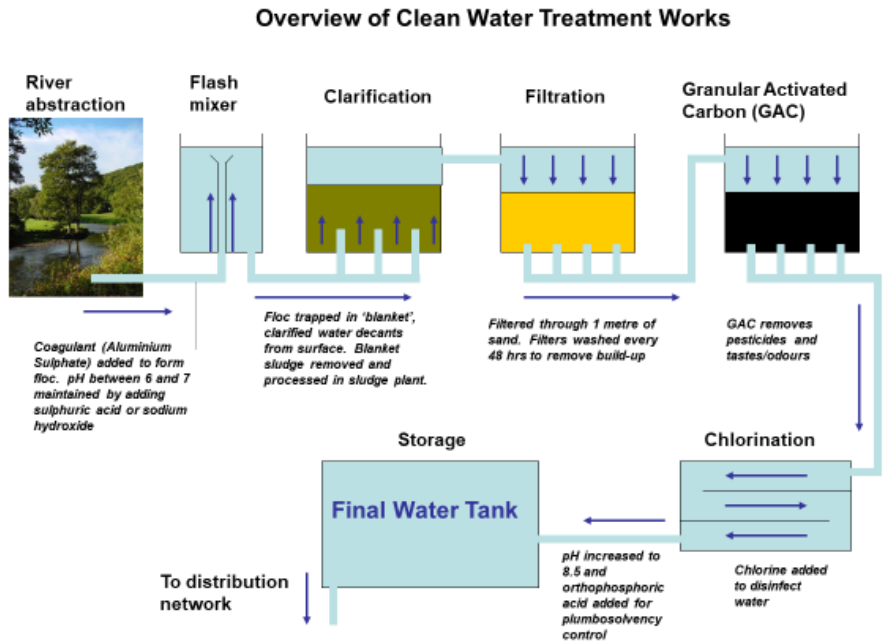
Population in the South West is due to rise by 15% by 2050, from its current total 5.7million people to approximately 6.5 million.

South West Water delivers over 340 million litres of water each day through some 15,000km/9,320miles of water mains to 800,000 homes and 70,000 businesses in the South West. About 95% of the water they supply is returned to them for treatment and disposal. They do this through some 14,995km/9,318miles of sewers, around 800 sewage pumping stations and over 600 treatment works, many of which serve a population of less than 1,000 people.
https://www.southwestwater.co.uk/wholesale/what-we-do/south-west-water/

The things that get added to drinking water during treatment are typically:

- A coagulant (usually aluminium sulphate) which helps to separate the solids from the water
- Sulphuric acid or sodium hydroxide to adjust the pH for optimum coagulation
- Polyelectrolyte is used to help settle the coagulated solids from the water
- Chlorine is used to disinfect the water
- Lime or sodium hydroxide is used to adjust the pH of the treated water
- Orthophosphoric acid is added for plumbosolvency control (to reduce the impact of any lead plumbing present in people's homes)

Diagram highlighting the basic water treatment process, based on the Pynes treatment works in Exeter:



South West Water is currently innovating their treatment process. They recently opened the Mayflower water treatment works, just north of Plymouth, which uses suspended ion exchange, inline coagulation and ceramic membrane microfiltration to produce more water, more efficiently and at a lower cost than traditional technology. It's the first time that these combined technologies have been used to produce high quality drinking water anywhere in the world. Video at link:
https://www.southwestwater.co.uk/about-us/Projects-investments/mayflower-water-treatment-works

The average person in our region uses 143 litres of water in a day, by the end of 2025 South West Water want to get that down to 128 litres. With 1.8 million customers, if everyone saved 5 litres of tap water a day, that would save nearly 10 million litres.
https://www.southwestwater.co.uk/save-water/

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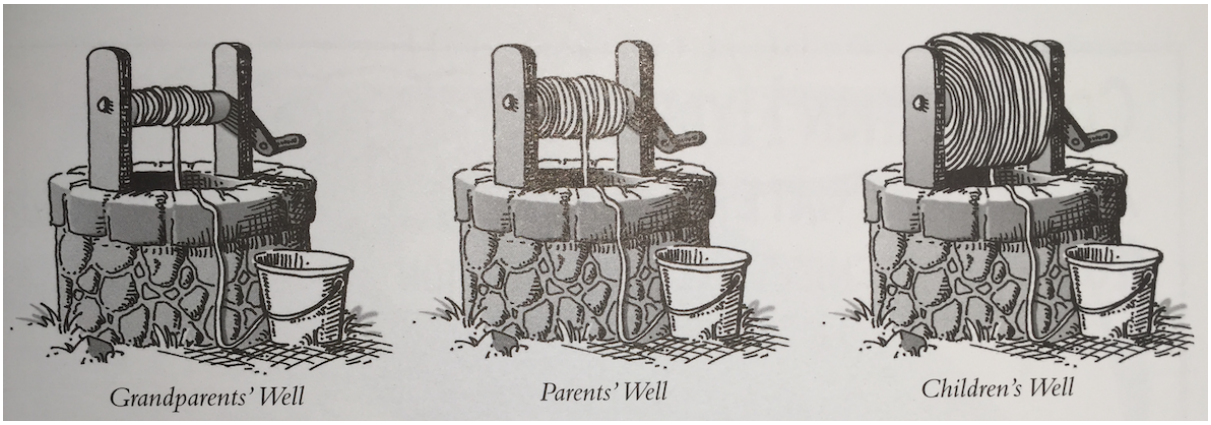
In the past, people used less water. Our grandparents only used 18 litres of household water a day.
https://www.south-staffs-water.co.uk/about-us/our-strategies-and-plans/regional-water-resources-plan



You can view the current levels of our reservoirs in the South West here:
https://www.southwestwater.co.uk/environment/a-precious-resource/current-reservoir-storages/

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You can view data about the flow of different rivers in the South West at the National River Flow Archive (the data is somewhat technical):
https://nrfa.ceh.ac.uk/data/search

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If the 15,000km of sewers and pipework in Devon were laid end to end you could get from Devon to Delhi and back. Sounds long but if you laid the blood vessels in the human body end-to-end it would stretch ten times further.

Section 5

UK-scale Issues and Policies on Freshwater

Fresh water is increasingly scarce. As Sir John Beddington, at that time England's chief scientific advisor pointed out in 2009: in 1950 there was 17,000 cubic metres for every person. By 2030 there will be 4000, although more than half is used in agriculture. Shortages are expected on almost every continent.

Climate change is increasing drought risk, the subject of our debate today. In England, May 2020 was the driest on record The Environment Agency's estimate is that summer rainfall is expected to decrease by approximately 15% by the 2050s in England, and by up to 22% by the 2080s.
Hotter drier summers and less predictable rainfall – two effects of a changing climate – plus over-abstraction of water for industry, agriculture and the public water supply as the population grows, is a toxic combination.

It means that if we don't take action, by 2050 the amount of water available in England could be reduced by up to 15%; that some rivers will have up to 80% less water in summer; and that we will need around 3.4 billion extra litres of water a day to meet the needs of people, industry and agriculture. Welcome to drought risk in the Anthropocene, UK-style.
(Sir James Bevan, Chief Executive of the Environment Agency, at a Royal Society Conference, 19 October 2021)

The Water Services Regulation Authority, or OFWAT, is the body responsible for economic regulation of the privatised water and sewerage industry in England and Wales. The Environment Agency is responsible for environmental regulation, and the Drinking Water Inspectorate for regulating drinking water quality.

OFWAT is currently mandating that all UK water companies plan for 2050 flow to customers to be the same as now. They are also saying that water companies need to secure resilience to meet a '1 in 500 year' drought by 2039. At the same time the Environment Agency (responsible for environmental regulation) is carrying out a national programme to assess climate change impact by 2050.

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In England, May 2020 was the driest on record. The Environment Agency's estimate is that summer rainfall will decrease by approximately 15% by the 2050s in England, and by up to 22% by the 2080s.

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The population of the UK is expected to rise from 67m now to 75 million in 2050. All those extra people need houses and roads and energy and food and places to work, all of which will require more water.

The National Infrastructure Commissions's 2018 report on our national infrastructure needs highlighted the risk of extreme drought and noted that the investment cost of resilience (£21bn) is roughly half the cost of an extreme drought (£40bn).
(Sir James Bevan, Chief Exec of the Environment Agency, Jaws of Death speech, March 2019)

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Research reveals 46% of people in the UK believe their household uses under 20 litres a day (roughly equivalent to a 2 minute shower). A further 32% believe they consume between 20 and 59 litres a day. In fact the average person in the UK uses 142 litres of water a day, meaning an average household of 4 could use over 500 litres.

However, while people are unsure about the amount of water they consume, the vast majority (68%) say they are willing to reduce the amount of water they use at home to help protect the environment.

Shower	13 litres/min power shower, 8 litres/min mixer shower, 5 litres/ min electric shower
Bath	80 litres per full bath
Toilet	5 litres/flush for a modern cistern as much as 9 litres/flush for an older toilet
Washing Machine	50 litres/cycle
Dishwasher	14 litres/ cycle for a modern dishwasher or 10 litres/ cycle on eco-setting
Hand Washing	8 litres per bowl wash, 30 litres per running tap wash
Car Washing	250 litres per hose use, 30 litres per bucket use

How much water different household appliances use

https://www.water.org.uk/news-item/vast-majority-of-brits-have-no-idea-how-much-water-they-use-each-day/

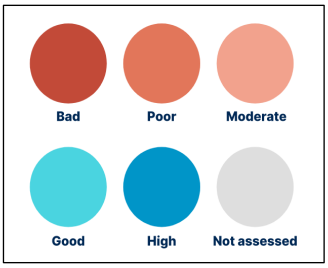
In parts of Denmark they use just 80 litres a day. After the recent drought in South Africa, they looked at how they could get use down to 50 litres.

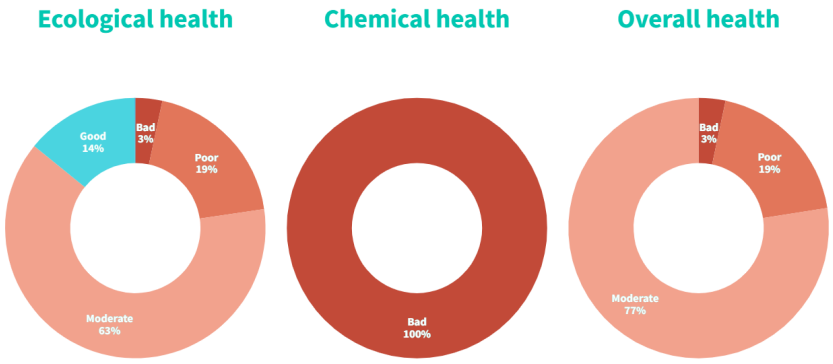
If in the UK, by 2050, we reduced per capita consumption to 100 litres a day, leakage by 50%, and did nothing else, it would provide enough water for an additional 20 million people without taking any more from the environment. And who's to say that by 2050 we couldn't get to 80 or 70 litres a day?
(Sir James Bevan 2019)

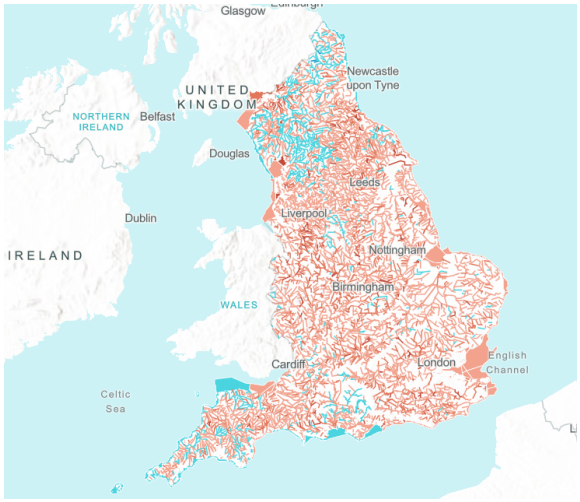
State of Our Rivers Online Report 2021

How healthy are rivers in England? Under the Water Framework Directive, a river's ecological health can be classed as High, Good, Moderate, Poor or Bad. Currently:

- 14% of rivers pass good ecological health
- No rivers pass good chemical health
- No rivers pass good overall health

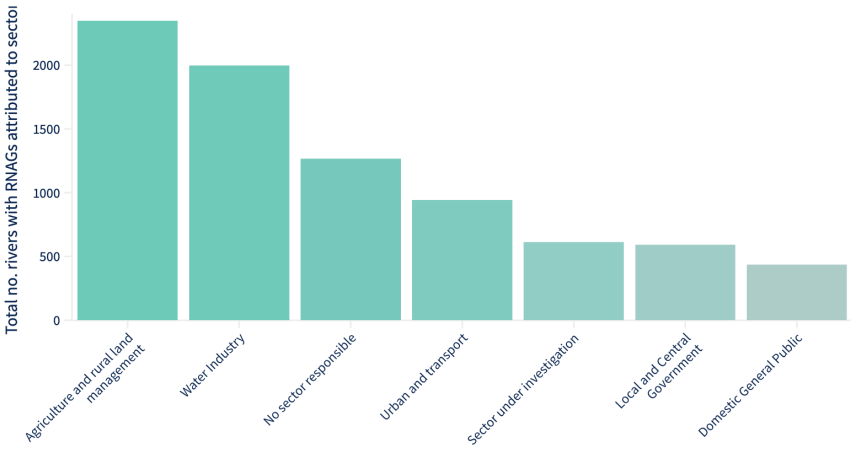






England river and waterbody health

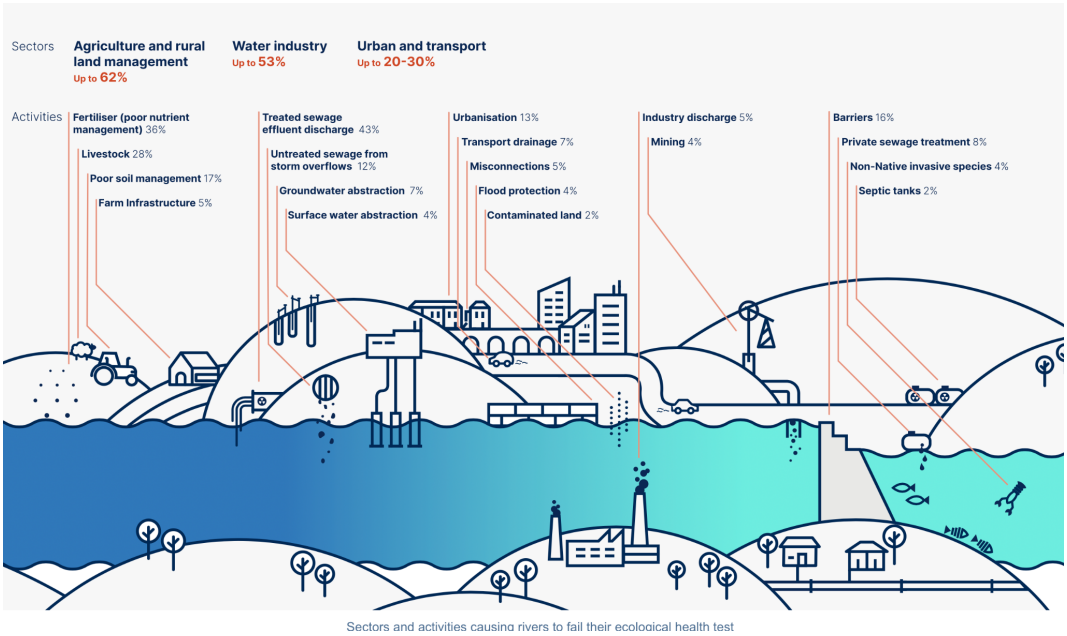
South Devon river and water body health



Please note: the chart details the number of distinct rivers atributed to each sector. i.e. Rivers with multiple RNAGS for a single sector are counted only once.

Number of distinct river water bodies negatively impacted by key sectors

Different sectors impacting on river health (RNAG = reasons for not achieving ‘good’ rating)



Major problems facing our rivers

Source: State of Our Rivers Online Report Oct 2021 (Rivers Trust)
https://storymaps.arcgis.com/collections/6730f10b64184200b171a57750890643?item=3

Is my river fit to play in? The Rivers Trust
This map shows where the sewerage network discharges treated effluent and overflows of untreated effluent and storm water into rivers in England & Wales. Avoid entering the water immediately downstream of these discharges to avoid the overflow (brown circles), especially after it has been training. Use the search box or zoom on the map to find your location.

https://experience.arcgis.com/experience/e834e261b53740eba2fe6736e37bbc7b

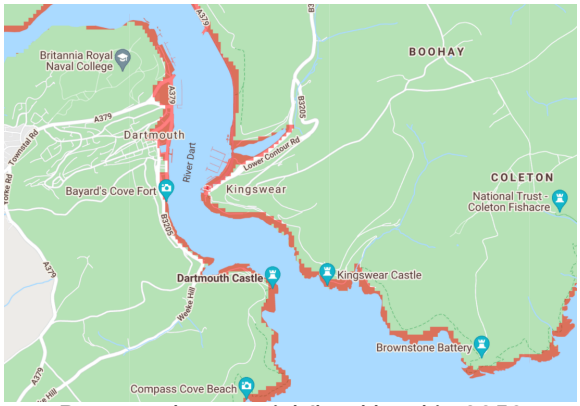
Sea Level Rise

Map LAND PROJECTED TO BE BELOW ANNUAL FLOOD LEVEL IN 2050

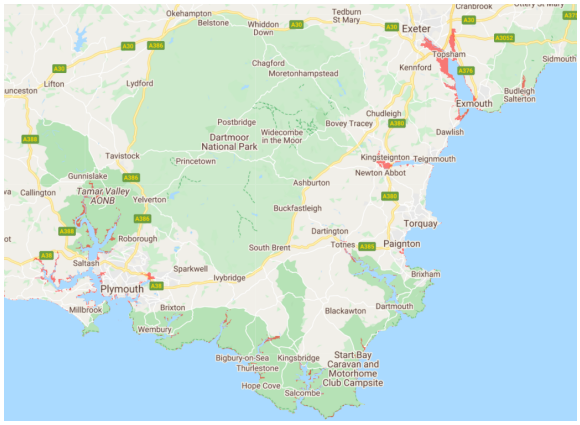
https://coastal.climatecentral.org/map/12/-4.0688/51.067/?theme=sea_level_rise&map_type=coastal_dem_comparison&basemap=roadmap&contiguous=true&elevation_model=best_available&forecast_year=2050&pathway=rcp45&percentile=p50&refresh=true&return_level=return_level_1&rl_model=gtsr&slr_model=kopp_2014

Land around the UK looks likely to be increasingly vulnerable to flooding. From projections of which land will be below annual flood levels in 2050 we can see that West Somerset, Exeter and Newton Abbot may be most profoundly affected in our region, but there will also be challenges to settlements along the tidal section of the Dart.

Totnes potential flood level in 2050



Dartmouth potential flood level in 2050



South Devon potential flood level in 2050

The UK potential flood level in 2050

[Climate Central - Coastal Risk Screening Tool]

Throughout England and Wales, there are more than 1,000 water treatment works that produce drinking water with an average quality rating of 99.96 percent. Water pipes owned by water companies stretch 346,000 kilometres, connecting more than 26 million properties. Between April 2019 and March 2020 there were approximately 47,000 pipe bursts, with an average of 2,954 million liters of water leaked each day during this period.
https://www.statista.com/statistics/1180360/key-figures-of-the-water-industry-in-the-united-kingdom/

Combined household water and sewerage bills in England and Wales averaged £410 for the year ended March 2021. On average, customers of South West Water had the most expensive water and sewerage bills in the UK at £506.
https://www.statista.com/statistics/827300/household-appliance-water-consumption-united-kingdom-uk/

Since 2015, investment in Britain's water sector has totalled 44 billion British pounds.
https://www.statista.com/statistics/827331/household-water-bill-united-kingdom-uk/

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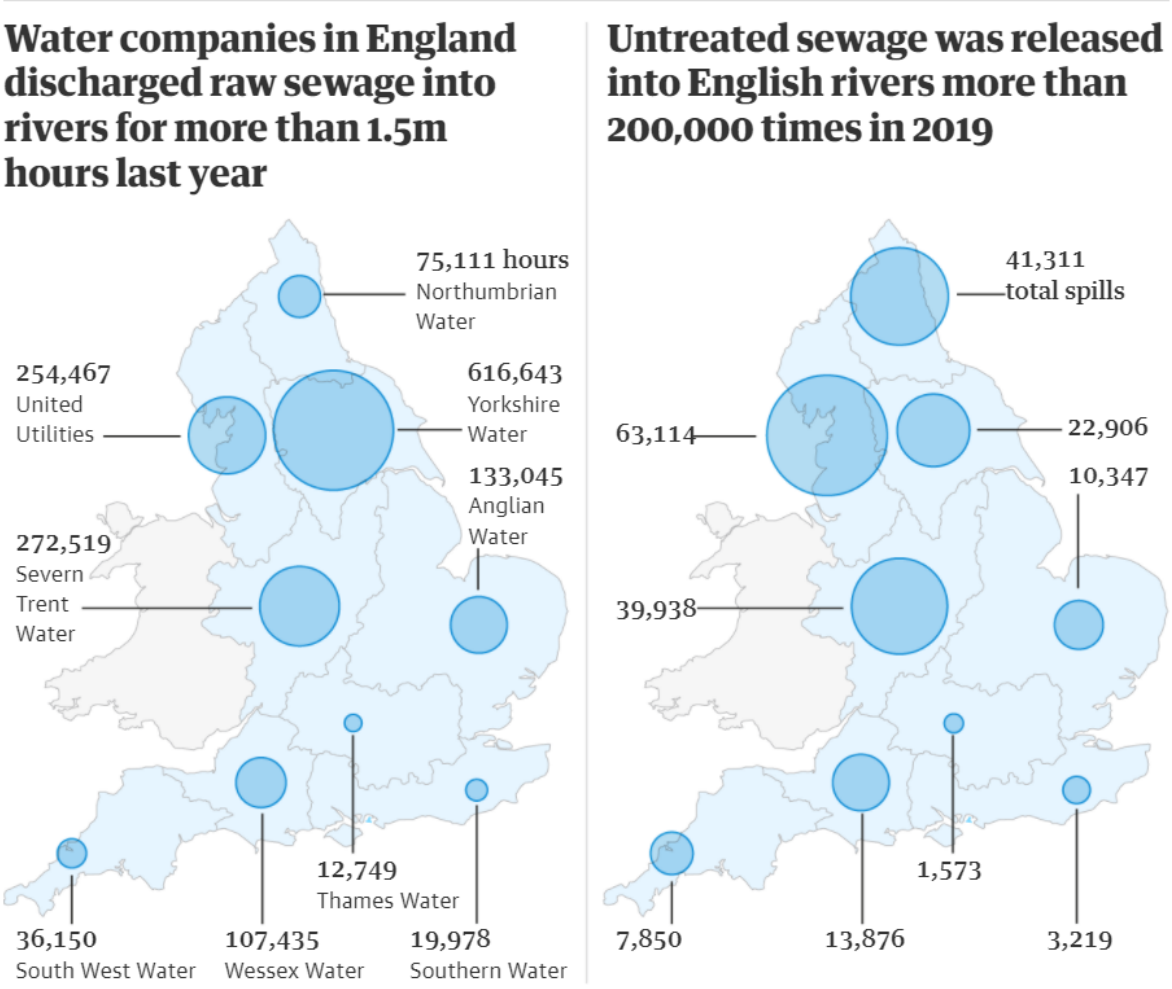
The water industry contributes 0.8 per cent of annual UK greenhouse gas emissions. However, the emissions that result from heating water in the home increases this figure to 5.5 per cent.

The Environment Agency's 2008 report into "Greenhouse gas emissions of water supply and demand management options" revealed that 89 per cent of carbon emissions in the water supply/use/disposal system is attributed to "water in the home" and includes the energy for heating water, which compares with public water supply and treatment emissions of 11 per cent.

Simple demand management measures, particularly those which reduce hot water use, have significant potential to not only promote water and energy efficiency but also to reduce the carbon footprint of the water supply/use/disposal system. For example, moving to full water metering across England and Wales could reduce annual emissions by 1.1 – 1.6 million tonnes of carbon dioxide per year. Moving to full metering in areas of serious water stress could potentially reduce annual emissions by between 0.5 – 0.75 million tonnes CO2e per year.
https://www.waterwise.org.uk/knowledge-base/greenhouse-gas-emissions-of-water-supply-and-demand-management-options-2008/

The State of our Rivers

https://waterwise.org.uk/wp-content/uploads/2019/10/WWT-Report-.pdf



After extreme rainfall, water treatment works cannot cope with the volume of water and untreated sewage. In certain situations the water companies are permitted by the government to release excess water and untreated sewage from combined sewer overflows into waterways. In 2019 reporting by the Guardian on the scale of the sewage releases led to debating around whether the current rules were being exploited and whether tighter regulations were required.
https://www.theguardian.com/environment/2020/jul/01/water-firms-raw-sewage-england-rivers

Section 6

Global-scale Impacts on Freshwater

97.5% of the world's water is locked in seas and oceans, too salty for human use. And most of the remaining 2.5% is in the ice caps. So we humans depend on the tiny bit available as fresh water – an essential natural resource for life.

But we don't just use water for drinking. We wash in it, clean with it, and use it to produce everything from clothing to food. Crop production – including feed for livestock and biofuels – is putting a great strain on fresh water supplies.

https://friendsoftheearth.uk/sustainable-living/13-best-ways-save-water

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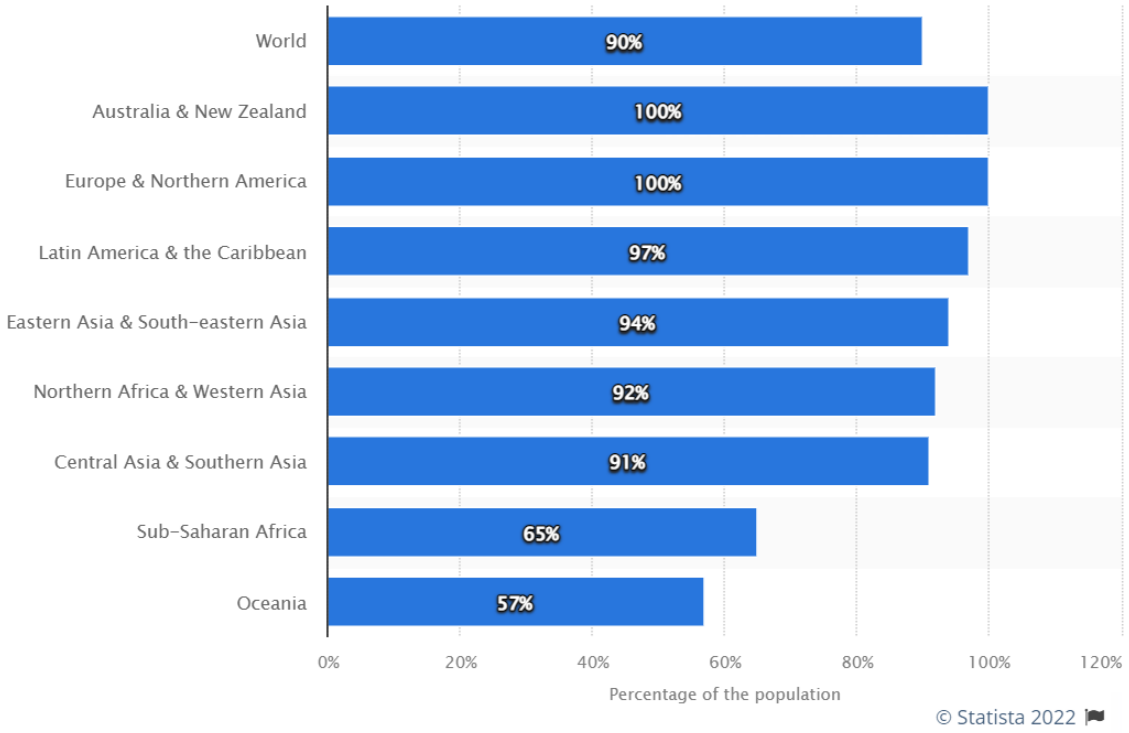
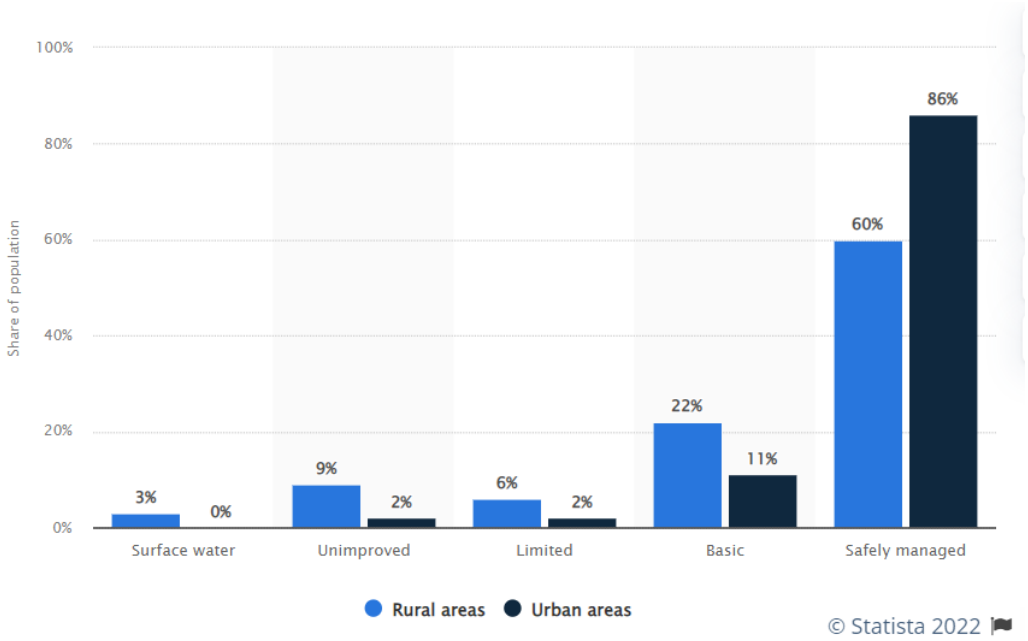
Fresh water is increasingly scarce. As Sir John Beddington, at that time England's chief scientific advisor pointed out in 2009: in 1950 there was 17,000 cubic metres for every person. By 2030 there will be 4000, although more than half is used in agriculture. Shortages are expected on almost every continent.

(Sir John Beddington, Perfect Storm speech, March 2009)

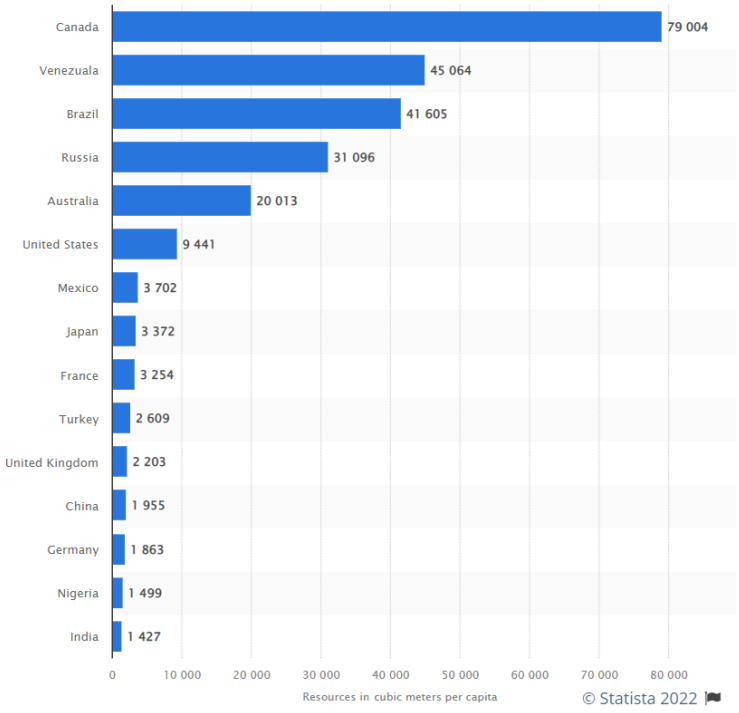


Estimated share of global population with access to at least basic drinking water services in 2020, by Sustainable Development Goal (SDG) region. This includes basic and safely managed drinking water. Where 'safely managed drinking water' is drinking water from an improved source that is accessible on premises, available when needed and free from faecal and priority chemical contamination and 'basic drinking water' is drinking water from an improved source, provided collection time is not more than 30 minutes for a round trip, including queuing.

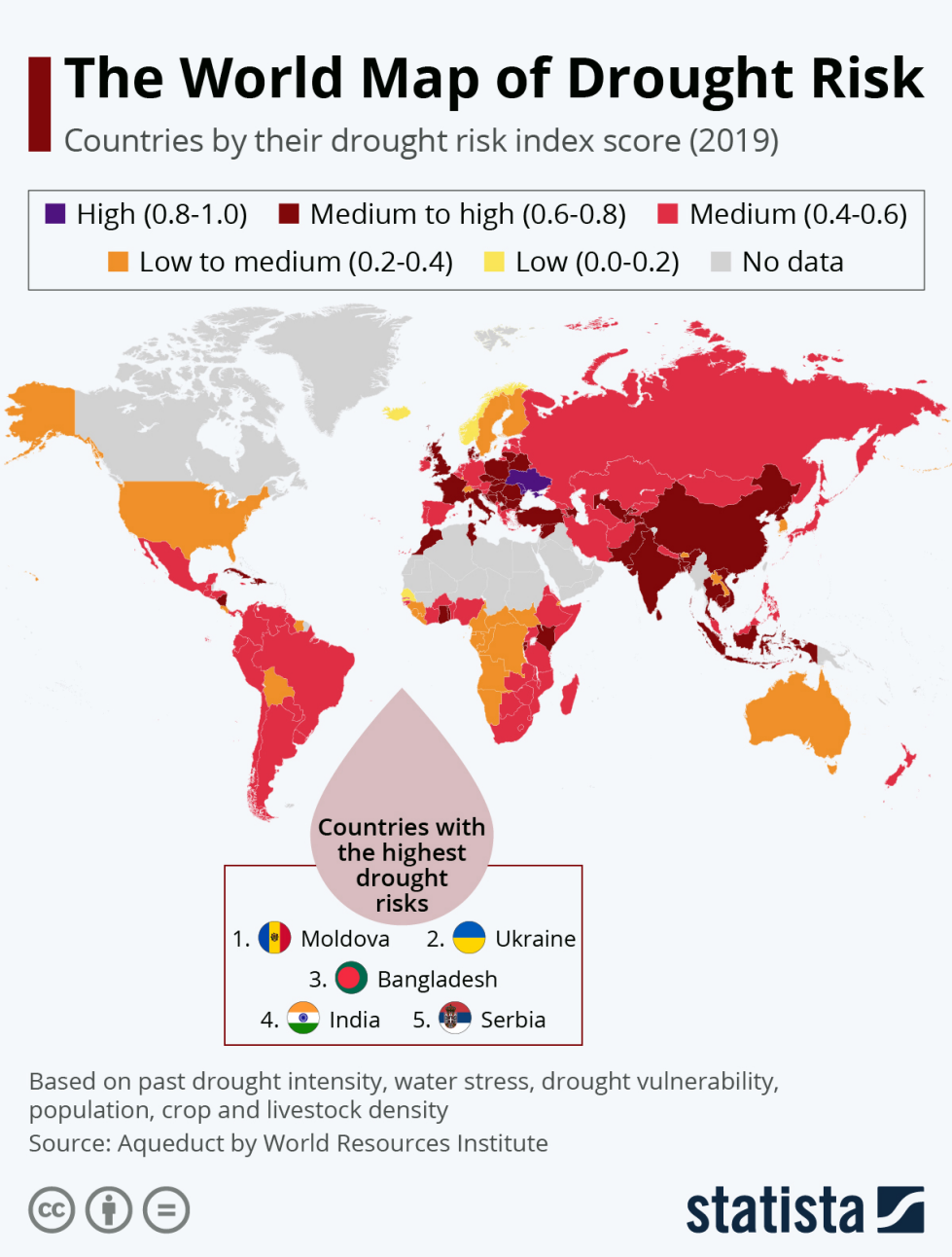


Drinking water coverage of urban and rural populations worldwide in 2020, by water source.

Unimproved water sources are those that are exposed to outside contamination, particularly faecal matter.
https://www.statista.com/statistics/278660/drinking-water-coverage-in-urban-and-rural-regions-worldwide/



Estimated renewable water resources per capita in select countries worldwide as of 2017
https://www.statista.com/statistics/269361/worldwide-renewable-water-resources/



The survey by the World Resources Institute collected data on 138 countries and took into account past drought intensity, water stress, drought vulnerability, population, crop and livestock density. https://www.statista.com/chart/25101/countries-by-drought-risk/

Key Impacts of Drought around the Globe:

Environmental Impacts
Droughts can compromise a wide range of ecosystem services, including the provisioning services such as food, fuel, and freshwater; regulating services such as pollination and pest regulation; and support services such as soil fertility and nutrient cycling. Significant or persistent droughts may alter ecosystem functions and compromise ecosystem goods and services, resulting in diminished or damaged ecological functioning.

Economic Impacts
Droughts may result in significant, long-term economic losses in a range of sectors. Losses may be local to the drought-affected area or they may be widespread through economic value chains and by

cascading losses to other sectors and the national or global economy. In some regions of the world, drought may cause or exacerbate food shortages and food insecurity, unemployment, poverty, inflation, conflict, and internal displacement or migration.

Cultural and Social Impacts
Cultural and social constructs underlie how water is perceived, valued, and managed in different societies. In many cultures and belief systems, water is strongly tied to cultural heritage and religious and spiritual practices. These may inform a social understanding of the causes and solutions for drought and may support communities in coping with drought. Further, drought impacts can vary in severity based on gender, ethnic group, religion, likelihood strategies, and other societal roles and vulnerabilities.

Health Impacts
Drought can cause significant human health impacts, and the socioeconomic environment in which drought occurs influences the resilience of affected populations. In poorer or marginalized communities, drought may exacerbate existing health disparities. Drought impacts on food production systems and agricultural value chains can contribute to nutritional deficiencies. Drought can also exacerbate gaps in sanitation and hygiene coverage and reliability, which may disproportionately affect women and girls when they are responsible for household water supply.

https://www.drought.gov/international

The Global Drought Monitor depicts current drought conditions across the globe using a “bottom-up” approach. This means that the drought conditions on each continent are assessed by the Nations of that continent.

https://experience.arcgis.com/experience/5dceec104a384df094e65af12a274959/

Over a quarter of the world's population faces extremely high levels of baseline water stress due to irrigated agriculture, industry, and municipal withdrawals. Baseline water stress measures the ratio of total water withdrawals to available renewable water supplies. Withdrawals also include domestic, industrial, irrigation and livestock (drinking water and other) uses.
Available renewable water supplies include surface and groundwater supplies and considers the impact of upstream water users and large dams on downstream water availability.

In a 2020 ranking of each country’s baseline water stress, many countries with the highest risk of water stress are in the Middle East. The UK came 64th out of 157 countries measured. The full index can be found here:

https://www.statista.com/statistics/1097524/water-stress-levels-by-country/

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This pack was put together by Isabel Carlisle, Sally Sutton and William Thomas for the Voices of the Dart project that took place in South Devon in 2021-2022, funded from South West Water’s Community Water-Saving Fund.
April 2022

For more information about The Bioregional Learning Centre and the Voices of the Dart project visit bioregion.org.uk